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Research article

Gamification and reputation: key determinants of e-commerce usage and repurchase intention

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ABSTRACT

Nowadays, companies know that keeping customers engaged is essential to increase their loyalty. The main goal of this study is to understand the impact of gamification and reputation on the intention of repurchase in e-commerce. Gamification corresponds to the regular usage of game elements in non-game context. This study purposes a theoretical model indicating the determinants of repurchase intention. Here we present an empirical study (survey collected data) within a real e-commerce usage context. Data were analysed with SEM/PLS method. Results indicate a positive impact of trust on the intention to use of e-commerce, on buy frequency and on repurchase intention. Ease of use, usefulness of e-commerce platforms affect intension to use. We verified the impact of reputation on trust, as well as the impact of gamification on the effective use of the e-commerce platforms. Results indicate that gamified e-commerce websites determine usage and use positively influences repurchase intention in e-commerce context.

1. Introduction

E-commerce registered a growth increase of 21% from 2017 to 2018 (Statista, 2018). E-commerce is changing the processes of how companies design, produce, and deliver their products and services and the way people trust vendors (Gefen, 2000; Laudon and Laudon, 2009). According to statistics of (Eurostat, 2017), since 2011 a growth occurred on the order of 65% of the number of businesses that have a strand of e-commerce, and almost half of the so-called large companies at European level already have it. Hamari (2013) suggests that services oriented strictly to rational behavior such as the e-commerce are examples of systems with the high potential to be gamified, as users can be oriented toward optimization of the economic process.

Given that people differ considerably, it becomes difficult to know which elements work best and which should be abandoned. These are just starting issues that give rise to the research function, which aims to analyze and clarify a relationship between a relatively recent topic (gamification) and an already-composed theme that moves money around the world (e-commerce). Some authors have conducted studies on e-commerce adoption and loyalty, some based their studies on information systems adoption theory others base their studies on consumer behaviour theory (Lin, 2007; Lowry et al., 2008; Lowry et al., 2014; Moody et al., 2017; Park and Yoo, 2018). Other studies were conducted to understand the impact of gamification on brand satisfaction and loyalty (Hsu and Chen, 2018; Hwang and Choi, 2019). McKnight et al. (2002) verified the positive impacts of trust in vendor in the intention of purchase, repurchase, and the intention of use. From these studies, and based on loyalty, trust reputation, gamification theory, information systems success theory and based on consumer based theory, we can infer that it is important to study the impact of reputation on trust in the vendor as well as the impact of gamification on the effective use of the system using a multi-theoretical perspective (Treiblmaier et al., 2018). A vendor is defined in literature as being the entity (an organization or a company) that provides a product or a service (Fang et al., 2014) in the context of our study we conducted this research on e-commerce vendors. The present study addresses the following research question: To what extent the gamification and reputation have an impact on e-commerce repurchase intention? To answer this question, we propose a theoretical model and validate it though PLS (Partial Least Squares). This paper contributes to theory by proposing a theoretical model for e-commerce gamified platforms based on effective e-commerce mechanisms, technology adoption, and gamification. Our results indicate that in the future e-commerce platforms will gain greater adherence from consumers if they integrate elements of gamification, namely the integration of points

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systems, badges, and dynamics. The study contributions are two-folded, first the identification of the determinant gamification elements in e-commerce repurchase model as it models the reality of repurchase intention of online customers and indicates that repurchase depends of reputation, perceived usefulness, ease of use, and gamification. Second, our model indicates that a that multi-theory approach explains 57% of online customer repurchase intention. This paper could be of interest to non-academic stakeholders, mainly to e-commerce decision makers, as it indicates that users' repurchase intention can be increased using gamified e-commerce platforms, defining which gamification elements are determinant to keep customers coming to their platforms.

In the next section 2 we present the theoretical background, followed by another section 3 in which we propose a research model of the impact of gamification and reputation on the repurchase intention when costumers use e-commerce websites. We present the way our empirical study was conducted, and then present the study results (section 4). In the last sections (5 and 6) we present the discussion and conclusions.

2. Theoretical background on e-commerce and gamification

Theoretical review rests on three main pillars. The first is a brief review of e-commerce, the second is the theory of adoption, and the third is gamification theory. Electronic commerce is a means by which transactions of goods or services happen using the web. These transactions occur between organizations and individuals or between two or more organizations (Aparicio and Nhampossa, 2011; Laudon and Laudon, 2009). According to the same authors, e-commerce can be defined as the use of the internet to assist in the management process of an organization. This relationship is established when there are trade relations between these companies and customers or even other companies. Today most transactions are supported by digital services of e-commerce platforms, that have been developed over the last two decades.

2.1. Technology acceptance theoretical background

The technology adoption theory (Davis, 1989) aims to foresee the behavioral intentions of an individual or a predisposition to behave in a particular way about the adoption and use of an information system (Wilkins et al., 2007). This model is based on the principles of Theory of Reasoned Action (TRA) to explain and predict the behaviors of individuals of the organization in a specific situation (Fishbein and Ajzen, 1975). The first factor is a consequence of a person's beliefs and the evaluation of perceived results. The second-factor influencing behavioral intent is explained by the individual normative beliefs and the motivation to obey (Vallerand et al., 1992; Davis, 1989). Various factors can explain the adoption of information technologies (Venkatesh and Davis, 2000). The so-called TAM2 provides a detailed insight into how both the social influence and the instrumental cognitive processes influence the intentions of use. As in this study we do not only modulate adoption of e-commerce, but also, we are focused on the main determinants of repurchase as way of achieving customer retention. In literature the customer retention corresponds to the third stage of the customer engagement (Bijmolt et al., 2010). Customer engagement can be defined as a customer behavior concerning a brand or a firm (Bijmolt et al., 2010; Van Doorn et al., 2010). According to Bijmolt et al. (2010) customer engagement can be decomposed in three phases: the first phase is customer acquisition; second phase is customer development, and the third phase is the customer retention. Customer retention leads to repurchase, in our research we study reputation and gamification as determinants to using and repurchase in e-commerce. For this reason we present here the theoretically based elements that might lead to a real engagement, gamification is one of the dimensions presented in literature that produces that effect (Högberg et al., 2019).

2.2. Loyalty, trust, and reputation in e-commerce

The competitors in the world of e-commerce are just a few mouse clicks away. As a result, consumers can compare competing products and services with a minimum expenditure of time and effort (Srinivasan et al., 2002). According to Zeithaml et al. 1996, loyal customers develop connections with the company and behave differently from ordinary customers. Consumer loyalty has an impact on the attitudes taken and consequently on the purchase intent. While loyal customers focus on aspects of the transaction and their relationship with the company, common customers focus mainly on the economic aspects (Jain et al., 1987). The *commitment is defined as an implicit or explicit promise of relational continuity between Exchange partners* (Dwyer et al., 1987). Literature indicates that the willingness to make short-term sacrifices implies long-term benefits (Dwyer et al., 1987).

Loyalty in the context of e-commerce leads the *e-Loyalty, which is defined as a favorable attitude toward the vendor that leads to a repeat of the buying behavior* (Srinivasan et al., 2002). In accordance with Sambandam and Lord (1995), loyalty to a business reduces the amount of effort spent in the search for alternatives by increasing the willingness of the individual to purchase products in the future on their platform. Research performed by Reichheld and Sasser (1990) revealed that loyal customers have lower price elasticities than regular customers and consequently are willing to pay more and continue with their elective shopping than to waste time searching for new stores. To encourage customer loyalty, some stores offer customers a rewards card, whereby customers can earn points based on the products they buy. Points earned can be used for physical and online purchases as they accumulate (Adaji and Vassileva, 2017), as loyalty in commerce also has an impact on company's revenue (Reichheld, 1993). Researchers such as Dick & Basu, (1994), have determined the impact of loyalty on customer behavior, whereby one of the expected behavioral results resulting from e-Loyalty is a positive Word of Mouth, i.e. when an individual says positive things about the vendor to others. Also, loyalty programs may resemble game mechanisms, which have been used to provide economic benefits for customers who, in return, demonstrate e-loyalty (Hamari, 2013). Obtaining customer loyalty is vital in most cases for the success of service of e-commerce, and it can be encouraged through gamification. Other studies results indicate that repurchase as an expression of e-loyalty is directly influenced by users satisfaction towards the buying experience and towards the vendor, and is also directly influenced by brand love, as gamification influences indirectly users satisfaction (Diegmann et al., 2018; Hsu and Chen, 2018; Siswanto and Chen, 2016).

Online trust is generally considered to be a dependency on a specific company by its stakeholders about company activities in the electronic medium in general and specifically on their website, namely regarding credibility as a determinant of trust. Trust consists on the on customers' perceived confidence towards a specific retailer (Lowry et al., 2014; Shankar et al., 2002). Three attributes constitute the main elements of online trust: integrity, skill, and benevolence (Lee and Turban, 2001). For consumers, the assurance of online confidence helps mitigate vulnerabilities such as security and privacy violations associated with online transactions (Beldad et al., 2010; Kim and Peterson, 2017) have identified 16 items related to online trust that must be taken into account: willingness to trust, perception of risk, perception of security, perceived privacy, perceived reputation, perceived utility, perception of system quality, perceived service quality, perceived quality of information, project design, satisfaction, attitude, intent to purchase, repeated intent to purchase, intention to use and loyalty.

The previously established reputation of a vendor also influences the likelihood of a potential customer making a purchase; *reputation can be defined as an assessment of the potential desire of an entity in which evaluation is established by a group of external people* (Standifird, 2001) in the context the evaluations made by previous purchasers. With the expansion of e-commerce in recent decades, concerns about the security issues are also growing (Kim et al., 2008; Moura and Albertin, 1998). The rising number

of Internet fraud causes consumers to become more careful, looking for information about the vendor and taking it into account in the purchase decision (Karahanna et al., 2013). Potential customers take into account the feedback from others at the time of the decision about a particular store or product (Mudambi and Schuff, 2010).

2.3. Gamification elements

Gamification is applied in various contexts, such as education, health, economics/business, among others (Costa et al., 2017). Gamification in online trading can help increase consumer involvement and constitutes a conscious replacement of the shopping experience as a form of entertainment (Insley and Nunan, 2014). This includes looking for fun and represents the most important segment of customers, as they tend to be more impulsive, thus generating more sales. Gamification can produce engaging experiences, thereby improving the way customers interact with a company or their brand (Robson et al., 2016). Understanding how customer involvement in the online purchasing process can be improved is, therefore, a significant factor in creating a successful digital strategy (Insley and Nunan, 2014). Gamification seeks primarily to increase the positive motivations of users about specific activities and, consequently, to improve the quantity and quality of their respective outputs (Hamari and Koivisto, 2015). All gamified applications have some peculiarities, the most common of which are rewards, points, badges, levels and leaderboards (Camerer, 2003). The term gamification can be misleading, suggesting that it represents the use of games (Keys and Wolfe, 1990) or game theory applied to the organizational world (Camerer, 2003). However, that is not what this is about.

Gamification is the application of elements of the game domain to change human behaviors in non-gaming environments (Camerer, 2003). The term is recent and defines the role of elements of games in contexts "not game" (Deterding et al., 2011). Gamification integrates game elements using guidelines that promote user involvement within a given dynamic (Costa et al., 2017). The term gamification started to draw attention in non-gaming contexts only in 2010, due to the increasing attention given to this theme by companies (Deterding et al., 2011). From the perspective of service gamification, is seen as a way that users create value (Zichermann and Cunningham, 2011). Despite the term, gamification derives from the game, it does not necessarily imply the presence of a playfulness. Games are interactive and challenging and give the player their intrinsic value. Numerous features of the game, (Schell, 2008), relate problem-solving activities with playful actions. A *Serious* Game is a system developed through game technologies and designed through game principles but with a different purpose than just entertainment (Garcia Pañella, 2012). Marczewski (2013) describes Serious Games as those that have been developed for reasons other than pure entertainment, such as simulators, games applied to teach or games with a specific purpose. The adjective "serious" is generally used as a reference to products used by services such as defense, education, science, health, engineering, politics, and religion (Derryberry, 2007). Game elements define the features that are present in games as a set of "Building Blocks" that may or may not be present in a game (Deterding et al., 2011). Elements can be categorized into five levels (Table 1): interface design and game design; game mechanics; design principles and heuristics; conceptual models and methods.

Since the concept of gamification includes "game elements" and "non-game contexts" Costa et al. (2017) classify these elements in certain dimensions according to the literature: Game mechanics; Game Dynamics; Game Aesthetics; Game Principles; Game elements; and Game components. Game mechanics are the functional components of a gamified application that provide various actions, behaviors, and control mechanisms that allow user interaction (Hunicke et al., 2004). Game mechanics can also be defined as the processes that drive certain actions (Werbach and Hunter, 2012; Kuutti, 2013). These are recurring parts of the game design that involve gameplay and among the more common are point systems, leaderboards, levels and badges, and involve status, rewards, competition, and achievements (Deterding et al., 2011). The purest form of mechanics is a reward mechanism for performing specific tasks (Swan, 2012). Mechanics are the decisions that designers take to specify the objectives, the rules, the context, the types of interaction (e.g., opponents), and the limits of the situation to be gamified. Mechanics are known before the beginning of the experience and remain constant, that is, they do not change from player to player and are equal whenever the activity is performed, in other words game mechanics are rules. Werbach and Hunter (2012) identify ten game mechanics that they consider essential, and that can be found in Table 2.

Dynamics determine individual reactions as a response to the use of the mechanics implemented. These reactions seek to satisfy fundamental needs and desires, including the desire for rewards, altruism, or competition (Bunchball Inc., 2010; Hunicke et al., 2004). According to Werbach and Hunter (2012), dynamics are the *Big-picture* aspect of the gamified system that has to be considered and managed but that never enters the game directly. Werbach & Hunter (2012) identify as the most relevant: (1) Restrictions (limitations or forced exchanges); (2) Emotions (curiosity, competitiveness, frustration, happiness); (3) Narrative (a consistent and continuous story); (4) Progression (Growing and development of the player) and (5) Relationships (social interactions that generate feelings of camaraderie, status, altruism). Aesthetics describe the emotional responses that users perceive when interacting with the game system (Hunicke et al., 2004). Aesthetics (Hunicke et al., 2004) suggest a targeted taxonomy including Feeling; Fantasy; Narrative; Challenge; Companionship Discovery; Expression and Submission. Crumlish & Malone (2009), on the other hand, argue that "game principles" are basic assumptions that have been accepted as true. *Game elements are the pieces that a designer joins when creating an immersive experience* (Werbach & Hunter, 2012, 2015). Game components are specific applications that can be seen and used in the game interface (Hunter and Werbach, 2012) and can be considered particular instances of mechanics and dynamics (Kuutti, 2013). Components act as stimulants and are often perceived directly from the consumer's perspective (Gatautis et al., 2016).

3. Research model proposal

The research hypotheses mentioned next served as support for the creation of the conceptual model, which is accompanied by a review of the literature. To measure the impact of gamification in e-commerce

Table 1. Game design elements' levels (Deterding et al., 2011).

Design Elements' Level	Description	Examples
Interface and game Design Patterns	Successful design components and solutions to a known problem.	Badges, leaderboards, levels
Design Patterns and mechanics	Using parts of the design of a game that concern the *Gameplay*.	Time constraint, limited resources, shifts
Design principles and Heuristics	Evaluation guidelines to address a design problem or analyze a particular solution.	Clear goals, variety of game styles
Game Models	Conceptual models of the game components or experiences.	MDA, challenge, fantasy, curiosity
Game Design Methods	Specific design processes and practices.	*Playtesting*, value-conscious game design, *Play centric* design

Table 2. Game mechanics (Werbach and Hunter, 2012).

Mechanic		Definition
Challenges	→	Puzzles and other activities implying a certain level of effort to resolve
Opportunity	→	Elements of Randomness
Competition	→	One player or group wins, and another loses
Cooperation	→	Players must work together to achieve a shared goal
Feedback	→	Get information about player progress
Acquisition of resources	→	Obtaining collectible or useful items
Rewards	→	Benefits of some action or realization
Transactions	→	Exchanges between players, directly or through intermediaries
Shifts	→	Sequential participation, alternating players
Win states	→	Goals that make a player or group the winner

systems, we included several constructs: perceived usefulness, perceived ease of use, intention to use, and use were adapted from Venkatesh & Davis (2000), while reputation, trust in the vendor, and intention to repurchase from Fang et al. (2014). The gamification construct is related to the work of Deterding et al. (2011), while the frequency of purchase is based on Ferrand et al. (2010). Gamification operationalization results from a more in-depth review summarized in section 2.2. The description and the leading authors for these constructs can be found in Table 3.

Perceived usefulness (PU) has proved to be a strong influence of user intentions (Davis, 1989) and should not be ignored. Although this construct has seen some mixed results, it has been validated by several researchers in the area of IS (Costa et al., 2016) as an important predictor of the user's intention to use (IU) (Petter et al., 2008). Previous studies (Gefen and Straub, 2000; O'Cass and Fenech, 2003a) suggest that for e-commerce systems perceived usefulness (PU) affects in the intention to use (IU) systems. Thus, we hypothesize the following:

Hypothesis 1. *The perceived utility of e-commerce systems has a positive impact on the user's intention to use them.*

Perceived ease of use (PEOU) influences directly perceived usefulness (Davis, 1989). PEOU has a positive influence on PU (Venkatesh and Davis, 2000). This is mainly explained because users tend to adopt information systems because of functionalities, and afterwards because of ease (Davis, 1989); Venkatesh and Davis (2000). Studies by (Gefen and Straub, 2000) suggests that for e-commerce systems the perceived ease of use (PEOU) has effects on perceived usefulness (PU). Influencing the intention to use directly and indirectly (through the perceived utility), the perceived ease of use that a user experiences while using an IS explains the behavioral intention (Davis, 1989) partially. The perceived ease of use showed a lower significance level than the perceived utility in previous studies (Petter et al., 2008). Studies in e-commerce confirm earlier investigations, in which suggesting that the indirect effect of PEOU on IU (Chuan-Chuan Lin and Lu, 2000) validates the adoption theory in e-commerce with a study of online buyers that mentions the positive correlation between PEOU and IU (O'Cass and Fenech, 2003a). Thus, we hypothesize the following:

Hypothesis 2a. *The perceived ease of use of e-commerce systems has a positive impact on the perceived utility of the system.*

Hypothesis 2b. *The perceived ease of use of e-commerce systems has a positive impact on the intended use of the system.*

The trust related literature explains that the establishment of initial confidence can quickly happen due to factors such as perceived image, layout, institutional structures, attitude, and reputation, (Benedicktus et al., 2010; McKnight et al., 1998). Several studies (Casaló et al., 2007; Doney and Cannon, 1997) mention that a website with a good reputation generates consumer confidence, fulfilling the commitments that were promised to them (Casaló et al., 2007). Factors such as reputation are powerful levers that vendors can use to build consumer trust, and to overcome the negative perceptions that buyers have about the safety of shopping on the web (McKnight et al., 2002). Various investigations suggest that reputation can be an essential factor at the time of the construction of confidence in an e-vendor (Fung and Lee, 1999; Grazioli and Jarvenpaa, 2000; Jarvenpaa et al., 1999). Other authors suggest the role of reputation as one of the antecedents of trust in e-commerce (Casaló et al., 2011; Edelman, 2011; Saastamoinen, 2009). Customers' trust on the sellers websites is determined by sellers' websites capability to offer a secure operation, in terms of payment methods, and in terms of the responsiveness of completeness of the transaction (Kusuma et al., 2020). Literature on e-commerce indicates that the reputation directly affects trust (Sadeghi et al., 2019; Chen et al., 2020). Thus, we hypothesize the following:

Table 3. Constructs definition.

Construct	Concept	Authors
Perceived usefulness (PU)	The confidence a person has that using a particular system would increase its performance in the buying process	(Davis et al., 1992; Venkatesh and Davis, 2000)
Perceived ease of use (PEOU)	The degree of effort a user has to apply for using a certain system.	(Venkatesh and Davis, 2000)
Reputation (REP)	An assessment of the potential desire of an entity, an external group of people establishes this assessment, as public value.	(Meynhardt, 2009; Standifird, 2001)
Gamification (GAM)	Application of elements of the games domain to change human behaviors in non-games environments.	(Deterding et al., 2011)
Intention to use (IU)	The degree of evaluative effect an individual associates to use the target system.	(Venkatesh and Davis, 2000)
Use (USE)	Behavioral response to the intention of the individual to the use of the system.	(Davis et al., 1992)
Buy frequency (BF)	The number of times a customer purchases within a specified period.	(Ferrand et al., 2010)
Trust in vendor (TV)	Online trust is generally considered to be a dependence on a specific company by its stakeholders concerning the company's activities in the online medium and specifically in their website, namely regarding credibility as a determinant of trust. Trust consists on the on customers' perceived confidence towards a specific retailer.	(Lowry et al., 2014; Shankar et al., 2002)
Repurchase intention (RPI)	The judgment of the individual on a new purchase of a product/service assigned from the same company, considering its current situation.	(Hellier et al., 2003)

Hypothesis 3. *The reputation of websites used by vendors in e-commerce has a positive impact on trust in vendors.*

Hamari (2013) suggests that rational behavior-oriented services, such as e-commerce, are examples of systems with high potential of being gamified since users can be directed to the optimization of the economic process. Insley and Nunan (2014) suggest that in the world of online commerce gamification can help generate a deeper level of use of the system on the part of the consumer. Gamification showed to have positive impact on use of information systems (Aparicio et al., 2019), rather than on user satisfaction. As gamification is defined in literature as the presence of game elements but in a non-game environment (Deterding et al., 2011), as those elements are sometimes not visible, or tangible, users might behave as a consequence of the way systems are designed and how they react, this lead to the formulation of gamification's impact on use rather than on intention to use. Hamari (2017) concludes that the presence of badges, one of the main elements of gamification in a transaction has made an increase of interactions in the tested system. Thus, we hypothesize the following:

Hypothesis 4. *The presence of elements of gamification in e-commerce systems has a positive impact on usage.*

Previous investigations have found that the intended use (IU) has a significant impact on the intended use of the system (USE) (Davis et al., 1992). Also, Venkatesh & Davis (2000) concluded that the behavioral intention mediated user perceived usefulness and perceived ease of use. In a meta-analysis of empirical research done with models of adoption (Legris et al., 2003), concluded that almost all studies that have tested the relationship IU-USE reported a positive relationship. Confirming previous findings in other fields of IS, including studies of e-commerce systems, they also found a relationship between behavioral intention (IU) and use (USE) (Koufaris, 2002).

Thus, we hypothesize the following:

Hypothesis 5. *The intended use of the e-commerce systems has a positive impact on usage.*

User retention is an essential subject in areas such as marketing (Wen et al., 2011). Researchers have studied retention in different contexts using different dimensions that impact the propensity of any intention to repurchase (Khalifa and Liu, 2007; Koufaris, 2002; Mouakket, 2009). One of the main variables of interest to a web-based vendor is consumer behavior, specifically user's availability to transact with the same website (McKnight et al., 2002). Purchase frequency is considered to be an essential construct of consumers' attitude toward a company (Schmittlein et al., 1987) and has been used in the past as an indicator of the success of the loyalty programs that induce the user to use the system more often (Bolton et al., 2000; Sharp and Sharp, 1997). In line with this, a proper loyalty program should have a positive impact on the average frequency of purchases (Sharp and Sharp, 1997). Thus, we hypothesize the following:

Hypothesis 6a. *The use of e-commerce systems has a positive impact on repurchase intention.*

Hypothesis 6b. *The use of e-commerce systems has a positive impact on the purchase frequency.*

Examining the intention to repurchase as a critical variable is common given the extensive presence of online commerce and knowing the past behavior often leads to continued behavior. However, one could argue that this behavior may increase or decrease depending on the context of the trade and the frequency of repurchases (Martin et al., 2015). A study within the framework of a gym that increased frequency leads to repurchase and repurchase intent leads to a future intention to repurchase (Ferrand et al., 2010). Thus, we hypothesize the following:

Hypothesis 7. *The purchase frequency in e-commerce systems has a positive impact on repurchase intention.*

Building consumer confidence is a strategic imperative for web-based vendors because confidence strongly influences the consumer to transact with unknown vendors via the web (McKnight et al., 2002). Some research suggests that online consumers generally stay away from e-vendors in which they do not have trust, and therefore it can be concluded that the higher the confidence, the higher the propensity to use (Gefen, 2000; Jarvenpaa et al., 2000; Reichheld and Schefter, 2000). Confidence in vendors positively affects the willingness to buy since it ensures the consumer that the supplier is capable of and willing to deliver the products and services purchased via the web (McKnight et al., 2002). Previous research shows that perceptions of trust directly or indirectly influence e-consumer intentions to buy (Grazioli and Jarvenpaa, 2000; Jarvenpaa et al., 1999). To attract potential buyers and turn casual shoppers into buyers, online vendors should provide various guarantees (for example, security and privacy) to inspire and maintain confidence previously established (Chiu et al., 2014). In a study of repurchase patterns on major websites (Reichheld and Schefter, 2000), found that among the main standards found were loyalty and the established trust relationship. Literature indicates that trust in e-commerce is positively related with purchase behavior (Lin et al., 2019). Thus, we hypothesize the following:

Hypothesis 8a. *The trust in vendor in e-commerce systems has a positive impact on the intended use of the system.*

Hypothesis 8b. *The trust in vendor in e-commerce systems has a positive impact on the purchase frequency.*

Hypothesis 8c. *The trust in vendor in e-commerce systems has a positive impact on repurchase intention.*

The proposal of this model integrates three theories, the adoption theory, e-commerce theory and the theory of gamification. Based on these theories the following model is then proposed (Figure 1).

4. Empirical study

The research model has been validated via quantitative method using scales previously tested and proven to operationalize each construct and increase the validity. Therefore, in the development of measuring instruments, these were adapted from empirical studies previously confirmed. We then created a questionnaire in which the first part consisted of questions of characterization of the sample and a second part measured the constructs chosen through a seven-point Likert-type scaling (1-completely disagree, (...) 7 – I agree completely). According to literature, in IS common method bias (CMB) is considered a concern about the data collection operationalization, we computed the Harman factor to assess on the CMB, and all the indicators passed that test (bellow 0.5) (Schwarz et al., 2017). Appendix A contains the final instruments of measure used to test the structural model. The questionnaire was constructed using validated scales, to ensure a common understanding of the questions. The gamification concept was not mentioned to the users during the survey, people were asked upon certain game elements derived from literature (Bunchball Inc., 2010; Hamari and Eranti, 2011; Hiltbrand and Burke, 2011), so users were not expected to have prior understanding on gamification design systems. The used sampling strategy for this research, embraced a random target population of voluntary of e-commerce website users, in the context both business to consumers (B2C) and consumers to consumers (C2C), in which there was a higher incidence in the dissemination of the questionnaire on social media. The questionnaire was distributed electronically through the platform (Surveymonkey, 2018). This study, comprised 204 users who replied to the questionnaire mentioned above. Users answered about their perception on their own experience in using B2C and C2C platforms, people addressed to their most used e-commerce platform, not to only one platform. Regarding gender, two-thirds of respondents identified themselves as male. In order to test gender bias, we preformed the t-test for equality of means, after preforming the Levene's test of equality

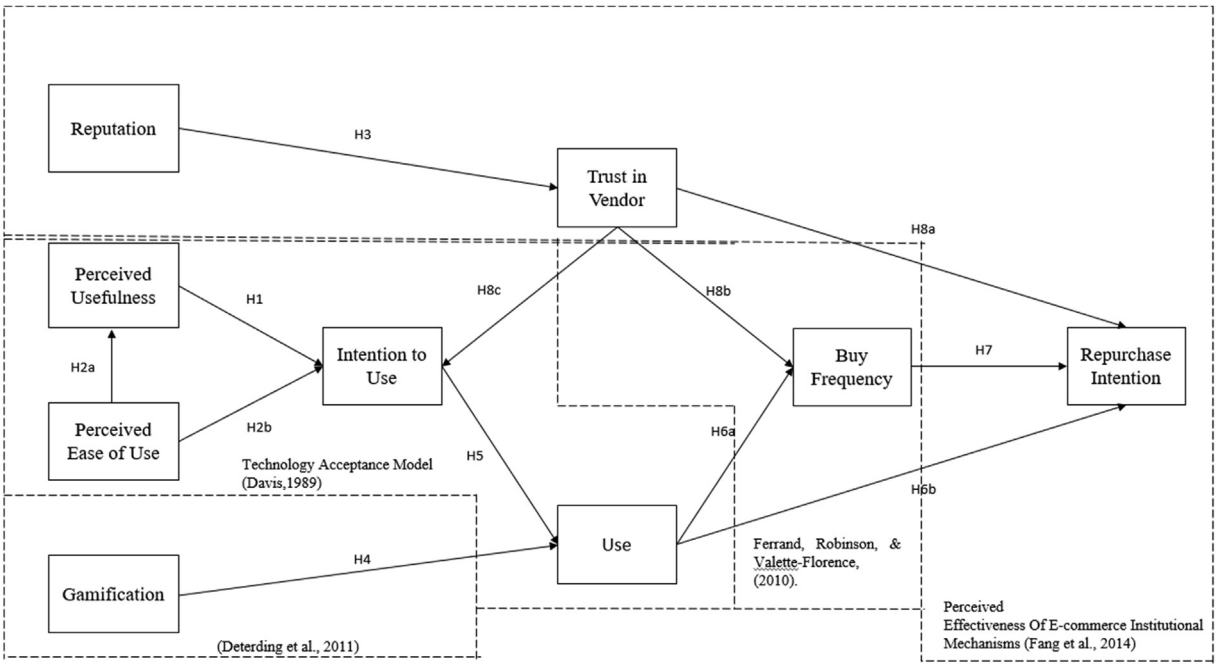

Figure 1. e-Commerce repurchase intention model.

of variances. Results indicated that does there was no gender bias. It is also possible to note that 172 respondents were 30 years old or younger. About the level of education, the degree with the highest number of respondents was Bachelor with about 41% of answers, corresponding to 84 responses. The overwhelming majority of those polled reside in the districts of Lisbon and Setubal, with a total of about 97% (177 responses). The on-line vendors referred by the respondents were: AliExpress 13%, Amazon 18%, Benfica 3%, Continente 1%, eBay 20%, El Corte Ingles 1%, Fnac 12%, GearBest 8%, PCDiga 4%, Sporting 2%, Worten 4%, and other on-line vendors 10%. Sample characterization is summarized in Table 4.

5. Results and discussion

To examine the relationship and the causal effects of the proposed model, we used the method of SEM/PLS (Hair et al., 2011; Ringle et al., 2005). The use of PLS is considered appropriate to test the measured model and validate the causality of a structural model. PLS minimizes residual variances of the endogenous dimensions and is considered in literature to be an adequate method to empirically validate a non-normal distributed sample (Hair et al., 2013; Henseler and Chin, 2010). SEM/PLS is also adequate regarding the sample size, which thumb rule indicates that the minimum for validating empirically this model is ten times the number of the construct which has more hypothesis (Cohen, 1992) as it uses a bootstrap to test those hypothesis, at least in 5000 subsamples.

Table 4. Sample characteristics.

Sample characteristics	(n = 204)	
Gender		
Female	68	33.33%
Male	136	66.67%
Age		
<= 30	172	84.30%
>30	32	15.70%
Instructional level		
High School	55	26.96%
Bachelor	84	41.18%
Post Graduate studies	23	11.27%
Master	40	19.61%
PhD	2	0.98%

5.1. Measurement model assessment

Table 5 indicates that the reliability of the items is above 0.70 (Hair et al., 2013). This means that all measurement items are reliable (Appendix B). The convergent and discriminant validity are shown in Table 5. Results indicate that all items converge and share a high proportion of variance. The commonality shows that the outer loadings of the dimensions have much in common when measuring latent variables (LV). Results on the discriminant validity test, show that each dimension is distinct from other dimensions. From Table 5 we infer that each indicator is associated with only one dimension. The cross-loadings table shows that the outer loadings of the indicators are greater than all the loadings in other dimensions (Gefen and Straub, 2005). Since the cross-loadings are indicators that are considered a fairly liberal criterion about discriminant validity, a more conservative approach to evaluating the discriminant validity was also taken into account. The of Fornell-Larcker criterion is based on the idea that a construct shares more variance with its associated indicators than with any other construct. This comparison can be found in Table 6, which shows that all the dimensions of the model are validated and the measures of different constructs that differ from each other (Fornell and Larcker, 1981; Hair et al., 2011).

5.2. Assessment of the structural model

Before the evaluation of the structural model, all constructs were tested regarding multicollinearity, which is considered a threat to the trial design model (Farrar and Glauber, 1967). We therefore calculated the variance inflation factor (VIF). The results showed that there is no multicollinearity, all VIF were less than 2.967 (Table 7), which lies below the restriction of 5 (Hair et al., 2017).

The quality of the structural model was evaluated using bootstrapping with 5000 subsamples from the original data set (Jörg Henseler et al., 2009). Figure 2 presents the results of the structural model.

Table 5. Measurement model results.

Construct	Item	Outer Loading	Composite reliability	Cronbach's Alpha	AVE	Discriminant validity?
PU	PU1	0.790	0.885	0.805	0.72	Yes
	PU2	0.862				
	PU3	0.891				
PEOU	PEOU1	0.755				
	PEOU2	0.895				
	PEOU3	0.889	0.916	0.876	0.733	Yes
	PEOU4	0.878				
VR	VR1	0.974	0.975	0.948	0.951	Yes
	VR2	0.976				
GAM	BD1	0.852	0.959	0.954	0.701	Yes
	BD2	0.893				
	DM1	0.850				
	DM2	0.732				
	MC1	0.812				
	MC2	0.859				
	LB1	0.809				
	LB2	0.801				
	PT1	0.874				
	PT2	0.882				
IU	IU1	0.925	0.912	0.854	0.777	Yes
	IU2	0.924				
	IU3	0.789				
USE	U1	1	Single item			
BF	CO1	0.975	0.975	0.948	0.950	Yes
	CO2	0.975				
TV	TV1	0.828	0.954	0.945	0.724	Yes
	TV2	0.804				
	TV3	0.87				
	TV4	0.849				
	TV5	0.773				
	TV6	0.906				
	TV7	0.907				
	TV8	0.860				
RPI	RPI1	0.888	0.935	0.895	0.829	Yes
	RPI2	0.973				
	RPI3	0.866				

Table 6. Fornell-Larcker criterion.

	PU	PEOU	RP	GAM	IU	USE	BF	TV	RPI
PU	**0.849**								
PEOU	0.465	**0.856**							
RP	0.446	0.498	**0.975**						
GAM	0.136	0.095	0.055	**0.837**					
IU	0.521	0.512	0.504	0.080	**0.881**				
USE	0.313	0.343	0.246	0.201	0.441	**1**			
BF	0.352	0.402	0.304	0.173	0.504	0.803	**0.975**		
TV	0.462	0.563	0.725	-0.006	0.571	0.239	0.321	**0.851**	
RPI	0.445	0.503	0.502	0.094	0.732	0.590	0.662	0.534	**0.910**

Bold values indiacte Square root of AVE in the diagonal.

SEM/PLS method determines that after establishing the validity of the measurement model, the structural paths are to be evaluated to test research hypotheses. The Perceived utility ($\widehat{\beta} = 0.276$, $p < 0.001$), the perceived ease of use ($\widehat{\beta} = 0.196$, $p < 0.05$) and trust in vendor ($\widehat{\beta} = 0.333$, $p < 0.001$) explain 43.4% of the variation of the intension to use. On the other hand, 52.5% of trust in vendor is explained by its reputation ($\widehat{\beta} = 0.725$, $p < 0.001$). We can still see that 22.2% of use can be explained by gamification ($\widehat{\beta} = 0.167$, $p < 0.05$) and intension to use ($\widehat{\beta} = 0.427$, $p < 0.001$). The perceived utility is also explained (21.6%) by perceived ease of use ($\widehat{\beta} = 0.465$, $p < 0.001$). It is also verifiable that the use ($\widehat{\beta} = 0.770$, $p < 0.001$) and trust in the vendor ($\widehat{\beta} = 0.137$, $p < 0.05$) explain 66.3% of frequency of purchase. Finally, 56.5% of the repurchase intention is explained by the used dimensions ($\widehat{\beta} = 0.184$, $p < 0.05$), purchase frequency ($\widehat{\beta} = 0.39$). The model supported all paths with at least a small predictive impact, as can be seen in Figure 2. Trust in vendor (TV) with $R^2 = 0.525$, purchase frequency (BF) with $R^2 = 0.663$, and

Table 7. Inner VIF.

	PU	PEOU	REP	GAM	IU	USE	BF	TV	RPI
PU					1.378				
PEOU	1				1.588				
REP								1	
GAM						1.006			
IU									
USE						1.006	1.061		2.822
BF									2.967
TV					1.582		1.061		1.116
RPI									

repurchase intention (RPI) with $R^2 = 0.565$, have values that can be considered substantial. Q^2 measures the predictive success, and positive values confirm the predictive model (Geisser and Eddy, 1979; Stone, 1974). The results show positive values for perceived utility ($Q^2 = 0.142$), intension to use ($Q^2 = 0.312$), use ($Q^2 = 0.197$), purchase frequency ($Q^2 = 0.593$), trust in vendor ($Q^2 = 0.346$), and repurchase intent ($Q^2 = 0.44$) (see Table 8).

All of the hypotheses are theoretically and empirically supported for e-commerce systems. The F^2 measures the contribution of exogenous variables in endogenous variables, intervals are: large effect ($F^2 > 0.350$), medium effect ($0.350 > F^2 > 0.150$), and small effect ($0.150 > F^2 > 0.020$). In Table 9 there is a summary of the following results. The results show that hypotheses 1, 2a, and 2b show different effects. All the effects are meaningful and positive but have different characteristics. In the first hypothesis, the perceived utility has a very significant influence on the intention of use ($p < 0.001$) and has a small effect to explain this relationship ($0.150 > F^2 > 0.020$). The relationship between perceived ease of use and perceived utility (hypothesis 2a) is very significant ($p < 0.001$) and has an average explanation effect ($0.350 > F^2 > 0.150$). The hypothesis 2b shows different results. The statistical significance of the perceived ease of use on the intention of use is average ($P < 0.050$) and the effect is small ($0.150 > F^2 > 0.020$).

To test the mediation effect of Perceived Usefulness, Intention to use, Trust Vendor, Use and Buy Frequency, we applied an analytical method recommended in literature (Nitzl et al., 2016; Carrión et al., 2017; Vance et al., 2015). We computed the variance accounted for (VAF) as suggested by Cepeda et al. (2016) to conclude about the rejection or not rejection of the mediation paths (Table 10). Form the results we can infer that e-commerce websites use fully mediates Buy Frequency and ReBuy influenced by Gamification. Trust in Vendor fully mediates Intention to Use and Use, influenced by Reputation. Results also indicate that Perceived Usefulness, Intention to use, Use, Trust Vendor and Buy Frequency partially mediate Rebuy in the e-commerce websites.

5.3. Discussion

The obtained results are in line with the literature, namely in the information systems theory (Venkatesh and Davis, 2000), our results indicate that the perceived ease of use and perceived usefulness have a great impact on e-commerce websites intention to use and effective usage. According to our study, vendors' reputation and trust have a significant positive impact on rebuy using e-commerce websites. These results are in line with the theory and previous research (Casaló et al., 2011; Edelman, 2011; Chiu et al., 2014). We also found that gamified e-commerce websites are determinant to the adoption and use of e-commerce, as suggested in previous empirical studies e.g. Hamari (2013; 2017) and Rodrigues et al. (2016). The $\hat{\beta}$ obtained go according to previous studies in the area of e-commerce (Gefen and Straub, 2000; Karahanna et al., 1999; Mouakket, 2009; O'Cass and Fenech, 2003; Wen et al., 2011) as well as the results obtained by Venkatesh & Davis (2000).

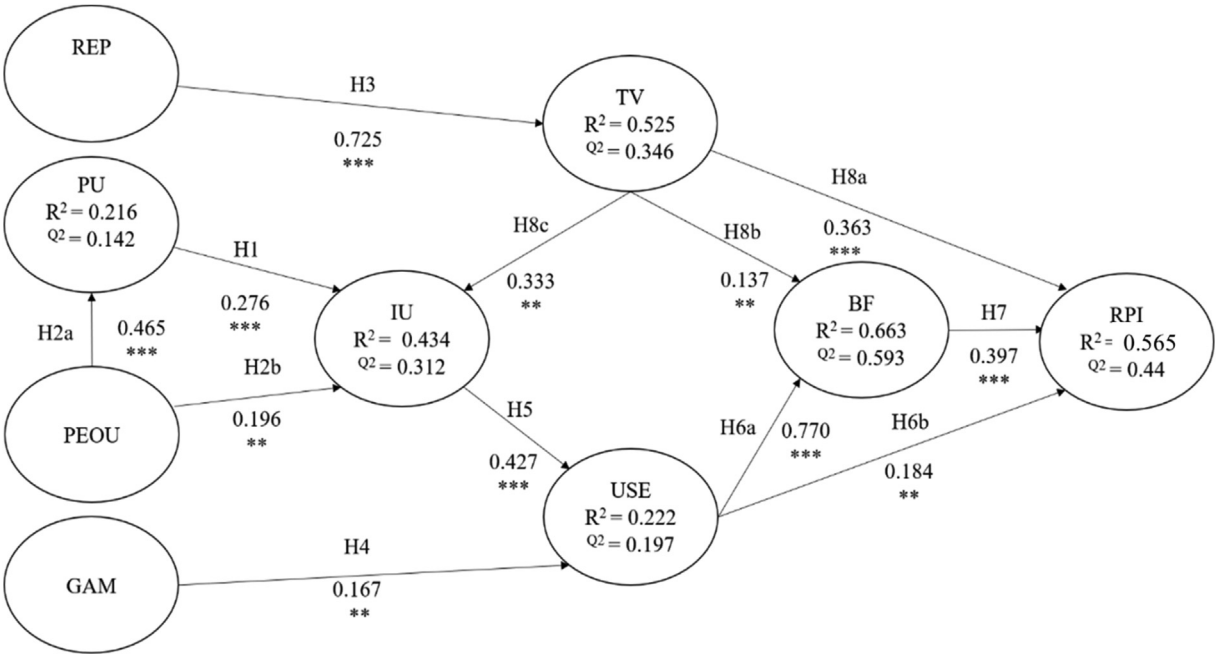

Figure 2. e-Commerce repurchase intention structural model results. Path *significant at $p < 0.05$; ** significant at $p < 0.010$; *** significant at $p < 0.001$.

Table 8. Hypothesis test results.

Hypotheses | Independ. variable	→	Depend. variable		Findings	Conclusion
H1	→	Perceived Usefulness (PU)	Intention to Use (IU)	Positively & statistically significant*** ($\widehat{\beta} = 0.276$, $p < 0.001$)	Supported with medium effect
H2a	→	Perceived Ease of Use (PEOU)	Perceived Usefulness (PU)	Positively & statistically significant*** ($\widehat{\beta} = 0.465$, $p < 0.001$)	Supported with large effect
H2b	→	Perceived Ease of Use (PEOU)	Intention to Use (IU)	Positively & statistically significant** ($\widehat{\beta} = 0.196$, $p < 0.05$)	Supported with medium effect
H3	→	Reputation (REP)	Trust in Vendor (TV)	Positively & statistically significant*** ($\widehat{\beta} = 0.725$, $p < 0.001$)	Supported with large effect
H4	→	Gamification (GAM)	Use	Positively & statistically significant** ($\widehat{\beta} = 0.167$, $p < 0.05$)	Supported with medium effect
H5	→	Intention to Use (IU)	Use	Positively & statistically significant*** ($\widehat{\beta} = 0.427$, $p < 0.001$)	Supported with large effect
H6a	→	Use	Buy Frequency (BF)	Positively & statistically significant*** ($\widehat{\beta} = 0.770$, $p < 0.001$)	Supported with large effect
H6b	→	Use	Repurchase Intention (RPI)	Positively & statistically significant** ($\widehat{\beta} = 0.184$, $p < 0.05$)	Supported with medium effect
H7	→	Purchase Frequency(BF)	Repurchase Intention (RPI)	Positively & statistically significant *** ($\widehat{\beta} = 0.397$, $p < 0.001$)	Supported with large effect
H8a	→	Trust in Vendor (TV)	Repurchase Intention (RPI)	Positively & statistically significant *** ($\widehat{\beta} = 0.363$, $p < 0.001$)	Supported with large effect
H8b	→	Trust in Vendor (TV)	Buy Frequency (BF)	Positively & statistically significant ** ($\widehat{\beta} = 0.137$, $p < 0.05$)	Supported with small effect
H8c	→	Trust in Vendor (TV)	Intention to Use (IU)	Positively & statistically significant ** ($\widehat{\beta}$= 0.333, $p < 0.001$)	Supported with medium effect

Notes: Path Coefficient $\widehat{\beta}$: NS = not significant; * significant at $p < 0.10$.; ** significant at $p < 0.05$.; *** significant at $p < 0.01$; Effect size: >0.350 large; >0.150 and ≤0.350 medium; >0.150 and ≤0.350 small (Chin, 1998; Cohen, 1988).

The only reputation-related hypothesis (H3) presents a very significant effect (F2 > 0.350) as well as a high significance ($p < 0.001$), i.e., the reputation has a very positive influence on the trust in the vendor. The $\widehat{\beta}$ value is higher than that of previous studies in the area of e-commerce (Fang et al., 2014; McKnight et al., 2002). With regard to the hypotheses that influence the use (H4 and H5) it can be concluded that both have significant effects, and H4 presents a median significance ($P < 0.05$) while H5 presents a high significance ($P < 0.001$), and with regard to the effects, H4 presents a small effect ($0.150 > F2 > 0.020$) while H5 presents an average effect ($0.150 > F^2 > 0.020$). As such, it can be concluded that both gamification (H4) and intended use (H5) have a positive effect on the use of the system. H4 presents at the level of $\widehat{\beta}$ a result that is very similar to that in the study of Aparicio et al. (2019). Our research indicates that the presence of badges, dynamics, mechanisms, leaderboards, and points, have impact on on-line vendors websites use. Thus, the on-line vendors websites usage is explained by gamification and intention to use. H5 presents results identical to previous studies, with a $\widehat{\beta}$relatively high (Rodrigues et al., 2016; Venkatesh and Davis, 2000) and a high significance (Venkatesh and Davis, 2000). Regarding the hypotheses H6a and H6b, no relevant data were found in the e-commerce area at the time of this research that would allow the comparison of values, which may be justified by the fact that possible new relations have not yet been studied between the dimensions used. However, the data in this study make it possible to say that H6a presents interesting results with a very significant effect ($f^2 > 0.350$) as well as a high significance ($p < 0.001$). H6B presents an average significance ($P < 0.050$) and a small effect ($0.150 > F^2 > 0.020$). It is then concluded that the use of the system has a great influence on the frequency of purchase (H6A) and presents a positive effect on the relationship with the intention of repurchase (H6b). Concerning H7, only one study was found at the time of our investigation that makes it possible to compare results, which might be due to this hypothesis still being little tested. This presents a small effect ($0.150 > F^2 > 0.020$) and a high significance ($P < 0.001$). The $\widehat{\beta}$ obtained is something higher than in the previous study (Ferrand et al., 2010) and so is the significance. The results obtained make it

Table 9. Summary of effects by hypothesis.

Hypotheses	Path			F2	Effect Size	p-value
H1	Perceived Usefulness (PU)	→	Intention to Use (IU)	0.097	Small	0
H2a	Perceived Ease of Use (PEOU)	→	Perceived Usefulness (PU)	0.275	Medium	0
H2b	Perceived Ease of Use (PEOU)	→	Intention to Use (IU)	0.043	Small	0.041
H3	Reputation (REP)	→	Trust in Vendor (TV)	1.105	Large	0
H4	Gamification (GAM)	→	Use	0.036	Small	0.012
H5	Intention to Use (IU)	→	Use	0.275	Medium	0
H6a	Use	→	Buy Frequency (BF)	1.661	Large	0
H6b	Use	→	Repurchase Intention (RPI)	0.028	Small	0.028
H7	Buy Frequency (BF)	→	Repurchase Intention (RPI)	0.123	Small	0
H8a	Trust in Vendor (TV)	→	Repurchase Intention (RPI)	0.271	Medium	0
H8b	Trust in Vendor (TV)	→	Buy Frequency (BF)	0.053	Small	0.005
H8c	Trust in Vendor (TV)	→	Intention to Use (IU)	0.124	Small	0.001

Table 10. Multiple mediation analysis.

Path	Specific Indirect effects	Total effects	VAF	Bias	Bootstrap 95% Confidence Interval		Mediation
					2.50%	97.50%	
Reputation -> Trust Vendor -> BuyFreq	0.099	0.179	0.553	0.001	0.030	0.174	Partial Mediation
Gam -> Use -> BuyFreq	0.129	0.129	1	0.01	0.025	0.216	Full Mediation
PEOU -> IU -> Use -> BuyFreq	0.064	0.107	0.598	-0.001	0.004	0.138	Partial Mediation
PEOU -> PU -> IU -> Use -> BuyFreq	0.042	0.107	0.393	0.001	0.019	0.075	Partial Mediation
Reputation -> Trust Vendor -> IU -> Use -> BuyFreq	0.080	0.179	0.447	0.001	0.035	0.131	Partial Mediation
PEOU -> PU -> IU	0.128	0.324	0.395	0.003	0.062	0.207	Partial Mediation
Reputation -> Trust Vendor -> IU	0.242	0.242	1	0.005	0.1	0.386	Full Mediation
Reputation -> Trust Vendor -> BuyFreq -> ReBuy	0.040	0.353	0.113	0	0.012	0.08	No Mediation
Gam -> Use -> BuyFreq -> ReBuy	0.051	0.082	0.622	0.004	0.014	0.102	Partial Mediation
PEOU -> IU -> Use -> BuyFreq -> ReBuy	0.026	0.068	0.382	0	0.003	0.067	Partial Mediation
PEOU -> PU -> IU -> Use -> BuyFreq -> ReBuy	0.017	0.068	0.250	0.001	0.007	0.036	Partial Mediation
Reputation -> Trust Vendor -> IU -> Use -> BuyFreq -> ReBuy	0.032	0.353	0.091	0	0.013	0.062	No Mediation
Reputation -> Trust Vendor -> ReBuy	0.263	0.353	0.745	0.002	0.169	0.369	Partial Mediation
Gam -> Use -> ReBuy	0.031	0.082	0.378	0.002	0	0.075	Partial Mediation
PEOU -> IU -> Use -> ReBuy	0.015	0.068	0.221	0	0	0.049	Partial Mediation
PEOU -> PU -> IU -> Use -> ReBuy	0.010	0.068	0.147	0	0.001	0.026	No Mediation
Reputation -> Trust Vendor -> IU -> Use -> ReBuy	0.019	0.353	0.054	0	0.003	0.045	No Mediation
PEOU -> IU -> Use	0.084	0.138	0.609	-0.001	0.005	0.175	Partial Mediation
PEOU -> PU -> IU -> Use	0.055	0.138	0.399	0.001	0.025	0.095	Partial Mediation
Reputation -> Trust Vendor -> IU -> Use	0.103	0.103	1	0.001	0.046	0.173	Full Mediation

Note: VAF would be smaller than 0.2 in the presence of a significant indirect effect (VAF <0.2, no mediation; 0.2 ≤ VAF ≤0.8, partial mediation; VAF >0.8, full mediation).

possible to conclude that the frequency of purchase has a positive effect on the intention of repurchase. The hypotheses influenced by the trust in the vendor (H8a, H8b, and H8c) all presented positive significances, with the impact of the trust in the vendor on the purchaser's intention presenting a high significance ($P < 0.001$) and an average effect ($0.350 > F^2 > 0.150$). The $\widehat{\beta}$ as well as the significance obtained are similar to those obtained by (Chiu et al., 2012). However, they present high values when compared to results of various other studies (Ha et al., 2010; Rose et al., 2012; Wen et al., 2011). Also, in the e-commerce area, the remainder (H8b and H8c) present an average significance ($P < 0.05$) and small effects ($0.150 > F^2 > 0.020$) and agree with the results obtained previously on other studies (Grazioli and Jarvenpaa, 2000; McKnight et al., 2002; Nicolaou and McKnight, 2006). The $\widehat{\beta}$ obtained also have values like the ones reported in these studies. Results indicate there is a positive effect of trust on the vendor in the intention of use, the frequency of purchase and the intention of repurchase. In our model, repurchase intention of on-line vendors websites are explained in 57% by trust in vendor, buy frequency, and use. Our results indicate that the most significant variable is buy frequency, however, use of on-line vendors websites have a stronger explanation effect of repurchase intention. From our study results, we can infer that the presence of gamification elements increases usage level of on-line vendors websites. These results bring relevant contributions not only to theory, but also to the implementation of e-commerce platforms, by indicating the importance of badges, dynamics, mechanisms, leaderboards, and points.

6. Conclusions and implications

This study's main goal is to understand whether the reputation and gamification determine e-commerce platforms' usage and if those dimensions influence in a positive way the repurchase intentions on those websites. To achieve this main goal, we studied the reality and proposed a model, which was validated through users' opinions. Results show indicate that our model explains 57% of online repurchase intention, determined by trust in vendor, by buying frequency, by online e-commerce platforms usage. Our results also indicate that gamification has a positive impact on online platforms usage, and reputation has a positive impact on vendor trust. The perceived usefulness and ease of use of the platforms are determinants of the intention to use of ecommerce platforms.

This paper attains two main theoretical implications. First, it proposes a theoretical model that integrates technology adoption theory with use of e-commerce systems with the presence of elements of gamification. Therefore, integrating dimensions of adoption models, combined with models of e-commerce, as well as the dimensions of other studies and the theory of gamification. Secondly, we empirically evaluated this research model in context of usage of real usage of ecommerce platforms. As practical implications of our study, it implies that consumer e-commerce platforms adoption is directly associated with the presence of gamification elements, such as points, badges, and dynamics, that produce a consumer sensation of rewarding as result. Consumers also give importance to the public image and reputation of e-commerce websites. Other functional aspects of e-commerce websites have direct and positive impact on behavioural intention, such as: the possibility of making shops faster, reducing time in unnecessary activities. The interface and effortless of usage are also considered very important in the user experience of e-commerce. Companies can increase their trustful image towards customers by providing a consistent quality of service, keeping promises increases the level of integrity and trustworthy.

This study is not without limitations. First, data were obtained from e-commerce users from only one country. Regarding age, the fact that more than 80% of respondents have 30 years old or less, as well as the fact that more than 90% of the sample lives in Lisbon and Setubal districts, may have some influence on the results obtained. Although the results are statistically significant, more research with a greater territorial scope will increase the explanatory power of the model. It would be interesting to observe the evolution of the repurchase plans depending on the public value and depending on the presence of gamification elements over time. It would also be important to understand verify if public values would have a greater explanation power of trust of the vendor than reputation.

As well as for future studies a cross-reference the data about the elements of gamification of the main websites with theories of types of user.

Declarations

Author contribution statement

M. Aparicio: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

C. J. Costa: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

R. Moises: Performed the experiments; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

Appendix A. Measurement Model

	Construct	Code	Indicator	Reference
Perceived usefulness		PU1	The use of this website makes me able to shop faster.	(Davis, 1989) Cronbach's alpha = 0.805
		PU2	The use of this website makes me reduce the time wasted on unnecessary activities.	
		PU3	The use of this website saves me time.	
Perceived ease of use		PEOU1	The use of the website doesn't require a big mental endeavor.	(Davis, 1989) Cronbach's alpha = 0.876
		PEOU2	The interaction with the website is clear and understandable.	
		PEOU3	It's easy to do what I intend to do through the website.	
		PEOU4	The website's interface is easy to use.	
Reputation		VR1	I consider that the website has an excellent public image	Cronbach's alpha = 0.948
		VR2	I consider that the website has an excellent reputation	
Gamification	Badges	BD1	The presence of a badges system increases my engagement with the website.	(*) Cronbach's alpha = 0.954
		BD2	The presence of badges makes me feel more likely to do actions to obtain them.	
	Dynamics	DM1	The presentation of progression elements makes me feel more engaged.	
		DM2	The fact of being able to write reviews makes me more engaged in the website.	
	Mechanics	MC1	The fact of being able to watch videos and get rewards makes me more engaged in the website.	
		MC2	The fact that I can receive some rewards (points, badges or ranking) whenever I do a review increases my engagement with the website.	
	Leaderboards	LB1	The presence of a leaderboards system increases my engagement with the website.	
		LB2	The presence of leaderboards on the website makes me do actions to get to a specific position.	
	Points	PT1	The presence of a points system increases my engagement with the website.	
		PT2	The presence of points makes me feel more likely to do actions to obtain them.	
Intention to Use (IU)		IU1	I plan to keep visiting the website.	(Davis, 1989) Cronbach's alpha = 0.854
		IU2	I intend to keep visiting the website in the long term.	
		IU3	I intend to talk about the website with my friends.	
Use (USE)		U1	I frequently use the website.	(Davis et al., 1992) Cronbach's alpha = 1
Buy Frequency (BF)		CO1	I frequently buy from this website.	(Ferrand et al., 2010) Cronbach's alpha = 0.948
		CO2	I am a frequent customer of this website.	

(continued on next page)

(*continued*)

Construct	Code	Indicator	Reference
Trust in Vendor (TV)	TV1	I believe that this vendor is consistent in quality and service.	Adapted from Fang et al. (2014) Cronbach's alpha = 0.945
	TV2	I believe that this vendor is keen on fulfilling my needs and wants.	
	TV3	I believe that this vendor is honest.	
	TV4	I believe that this vendor wants to be known as one that keeps promises	
	TV5	I believe that this vendor has my best interests in mind.	
	TV6	I believe that this vendor is trustworthy.	
	TV7	I believe that this vendor has high integrity.	
	TV8	I believe that this vendor is dependable.	
Repurchase Intention (RPI)	RPI1	I'm likely going to buy online again from the vendor in the short term.	Adapted from Fang et al. (2014) Cronbach's alpha = 0.895
	RPI2	I'm likely going to buy online again from the vendor in the medium term.	
	RPI3	I'm likely going to buy online again from the vendor in the long term.	

(*) Scale based on (Bunchball Inc., 2010; Hamari and Eranti, 2011; Hiltbrand and Burke, 2011).

Appendix B. Crossloadings

	(PU)	(PEOU)	(REP)	(GAM)	(IU)	(USE)	(BF)	(TV)	(RPI)
PU1	**0.790**	0.431	0.322	0.100	0.471	0.253	0.307	0.384	0.323
PU2	**0.862**	0.335	0.379	0.112	0.400	0.245	0.271	0.331	0.348
PU3	**0.891**	0.403	0.436	0.133	0.443	0.294	0.310	0.448	0.459
PEOU1	0.395	**0.755**	0.373	0.077	0.429	0.260	0.294	0.444	0.400
PEOU2	0.381	**0.895**	0.461	0.081	0.405	0.290	0.357	0.514	0.422
PEOU3	0.417	**0.889**	0.416	0.042	0.440	0.274	0.356	0.513	0.443
PEOU4	0.392	**0.878**	0.452	0.125	0.471	0.346	0.365	0.454	0.451
VR1	0.418	0.454	**0.974**	0.058	0.468	0.224	0.269	0.686	0.469
VR2	0.451	0.515	**0.976**	0.050	0.514	0.254	0.323	0.726	0.509
BD1	0.112	0.102	0.104	**0.852**	0.133	0.187	0.184	0.079	0.143
BD2	0.121	0.084	0.043	**0.893**	0.076	0.191	0.174	0.017	0.094
DM1	0.113	0.084	0.025	**0.850**	0.033	0.099	0.079	-0.028	0.032
DM2	0.182	0.149	0.092	**0.732**	0.100	0.259	0.259	0.093	0.155
MC1	0.065	0.052	0.026	**0.812**	0.007	0.092	0.053	-0.026	-0.004
MC2	0.028	0.072	0.014	**0.859**	0.013	0.102	0.107	-0.015	0.060
LB1	0.122	0.02	0.051	**0.809**	0.026	0.115	0.083	-0.062	0.039
LB2	0.092	0.006	0.024	**0.801**	0.015	0.124	0.100	-0.121	0.041
PT1	0.122	0.071	0.036	**0.874**	0.080	0.156	0.120	-0.028	0.059
PT2	0.079	0.058	-0.018	**0.882**	0.067	0.177	0.102	-0.097	0.031
IU1	0.531	0.455	0.421	0.079	**0.925**	0.447	0.491	0.512	0.676
IU2	0.450	0.460	0.506	0.091	**0.924**	0.376	0.435	0.541	0.678
IU3	0.385	0.440	0.408	0.035	**0.789**	0.333	0.403	0.454	0.578
U1	0.313	0.343	0.246	0.201	0.441	**1**	0.803	0.239	0.590
CO1	0.383	0.369	0.292	0.155	0.480	0.805	**0.975**	0.291	0.636
CO2	0.302	0.414	0.302	0.183	0.503	0.76	**0.975**	0.335	0.655
TV1	0.462	0.563	0.665	0.034	0.530	0.289	0.365	**0.828**	0.519
TV2	0.372	0.433	0.632	0.092	0.466	0.182	0.217	**0.804**	0.464
TV3	0.351	0.405	0.573	-0.044	0.421	0.139	0.232	**0.870**	0.403
TV4	0.382	0.427	0.597	-0.022	0.405	0.115	0.180	**0.849**	0.374
TV5	0.348	0.471	0.491	0.034	0.509	0.214	0.284	**0.773**	0.464
TV6	0.421	0.511	0.654	-0.042	0.554	0.24	0.325	**0.906**	0.494
TV7	0.407	0.539	0.702	-0.019	0.492	0.245	0.300	**0.907**	0.460
TV8	0.378	0.452	0.588	-0.082	0.482	0.168	0.250	**0.860**	0.433
RPI1	0.398	0.427	0.411	0.130	0.607	0.60	0.632	0.398	**0.888**
RPI2	0.411	0.477	0.487	0.071	0.705	0.566	0.652	0.513	**0.973**
RPI3	0.409	0.471	0.473	0.057	0.688	0.442	0.519	0.551	**0.866**

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